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180. Proposed by the late JOSIAH H. DRUMMOND.

If r/s is such a value of p as makes $m/(p^2 - 2)$ integral, prove that $(3r+4s)/(2r+3s)$ is another such value, so that an indefinite number of integral values may be obtained.

Also, if r/s is such a value of p as makes $2m/(p^2 - 2)$ integral, prove that $2(r+s)/(r+2s)$ is also such a value.

GEOMETRY.

201. Proposed by W. J. GREENSTREET, M. A., Editor of The Mathematical Gazette, Stroud, England.

Two plane sections of a right circular cone have their major axes AA' , aa' coplaner, and AA on one generator equal to $A'a'$ on the other. The projections of the sections on any plane perpendicular to the axis are confocal.

202. Proposed by G. B. M. ZERR, A. M., Ph. D., Professor of Chemistry and Physics, The Temple College, Philadelphia, Pa.

The equations $\sqrt{(la)} + \sqrt{(m\beta)} + \sqrt{(n\gamma)} = 0$ and $l\beta\gamma + m\alpha\gamma + n\beta\alpha = 0$ represent ellipses. If a, b, c are the sides of the triangle of reference, transform to Cartesian coördinates and find area of each ellipse.

CALCULUS.

166. Proposed by T. N. HAUN, Mohawk, Tenn.

Find the volume of the solid formed by the revolution of the curve $(y^2 + x^2) = a^2(x^2 - y^2)$ round the axis of x .

167. Proposed by G. B. M. ZERR, A. M., Ph. D., Professor of Chemistry and Physics, The Temple College, Philadelphia, Pa.

$$\text{Integrate, } \int_0^a \int_0^b \int_0^c \frac{z dx dy dz}{(x^2 + y^2 + z^2)^{\frac{3}{2}}}.$$

MECHANICS.

157. Proposed by T. W. WRIGHT, Schenectady, N. Y.

Explain why a waterfall h feet high can support a column of water $2h$ feet high.

158. Proposed by G. H. HARVILL, A. M., Malakoff, Texas.

Show that a law of density for points in space may be assumed such that the joint mass of any two points which are electrical images of each other in respect to a given sphere may be constant, and that their centers of gravity shall lie on the surface of the sphere.

AVERAGE AND PROBABILITY.

143. Proposed by L. C. WALKER, A. M., Graduate Student, Leland Stanford Jr. University, Cal.

The extremities of two equal lines drawn from a fixed point in the circumference of a given circle is joined. Find the average area of the circle inscribed in the triangle formed.

144. Proposed by F. P. MATZ, Sc. D., Ph. D., Professor of Mathematics and Astronomy in Defiance College, Defiance, Ohio.

In a circular park 400 feet in diameter are 4 equal circular ponds of variable diameter. What is the probability that a sightless person walking in a straight line from the center of the park, will step into a pond?

MISCELLANEOUS.

138. Proposed by L. C. WALKER, A. M., Graduate Student, Leland Stanford Jr. University, Cal.

Find an invariant of the third degree in the coefficients of a ternary quartic.

139. Proposed by L. C. WALKER, A. M., Graduate Student, Leland Stanford Jr. University, Cal.

Given the roots of a binary cubic, to find the roots of its two independent covariants.

NOTES.

Professor W. F. Osgood of Harvard University, has been promoted to a full professorship of mathematics. F.

Dr. C. A. Noble has been promoted to an assistant professorship of mathematics at the University of California. F.

Professor Alexander Macfarlane delivered, at Lehigh University, April 20-23, a course of six lectures on the British mathematicians, Kirkham, Babbage, Whewell, Dodgson, Stokes, and Rayleigh. F.

Professor John J. Quinn has brought to public attention a third triangle, to be used with the two triangles commonly used in drawing sets, and in a small circular illustrates many constructions which are easily made by means of this triangle of which he is the inventor. F.

Professor Josiah Willard Gibbs, of Yale University, died at New Haven, April 28th, 1903, of heart disease. Professor Gibbs was born in New Haven, Feb. 11, 1839, and graduated at Yale in 1858. In 1863, he received the degree of Doctor of Philosophy. After studying in Paris, Berlin, and Heidelberg, he was appointed, in 1871, to the Professorship of Mathematical Physics in Yale, which position he held until the time of his death. He was a member of the Royal Society of London, of the National Academy of Science, of the American Mathematical Society, and many other learned bodies. He was an authority of the first rank in thermo-dynamics, and in the application of vector analysis to physical problems. Last year, 1902, he published a work entitled *Elementary Principles in Statistical Mechanics*. F.